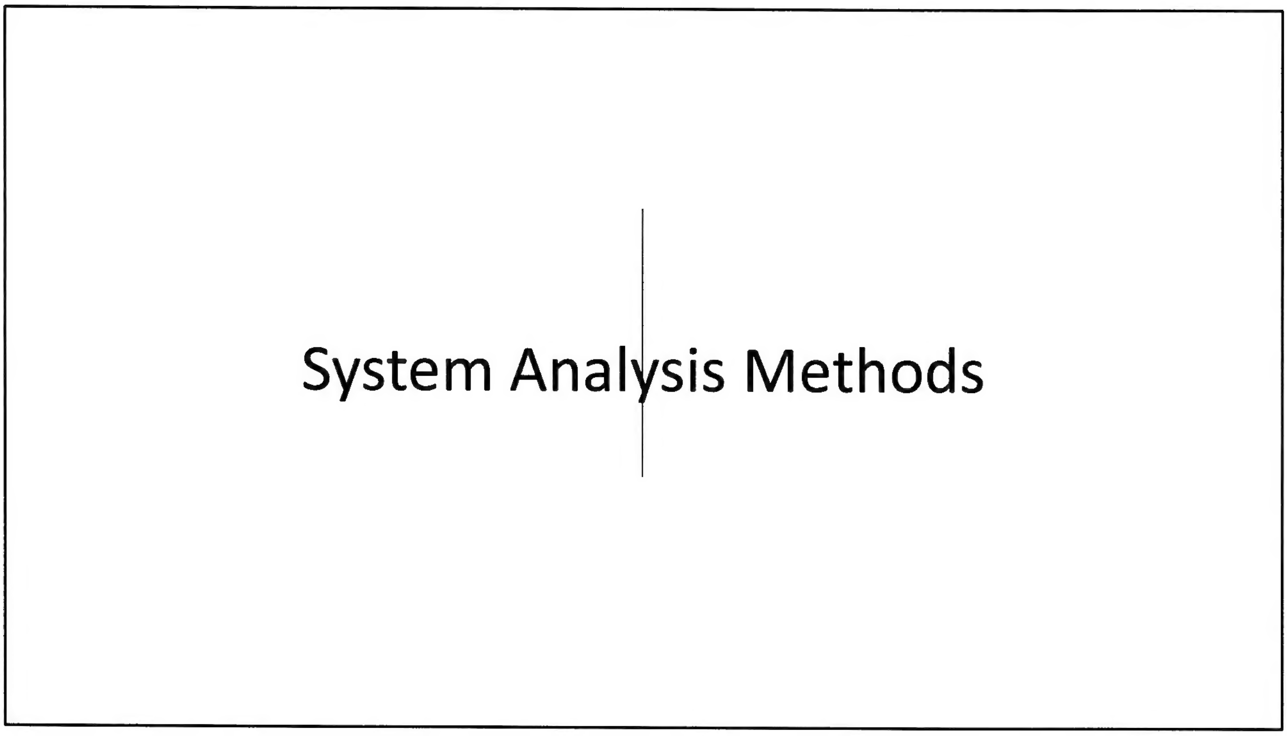
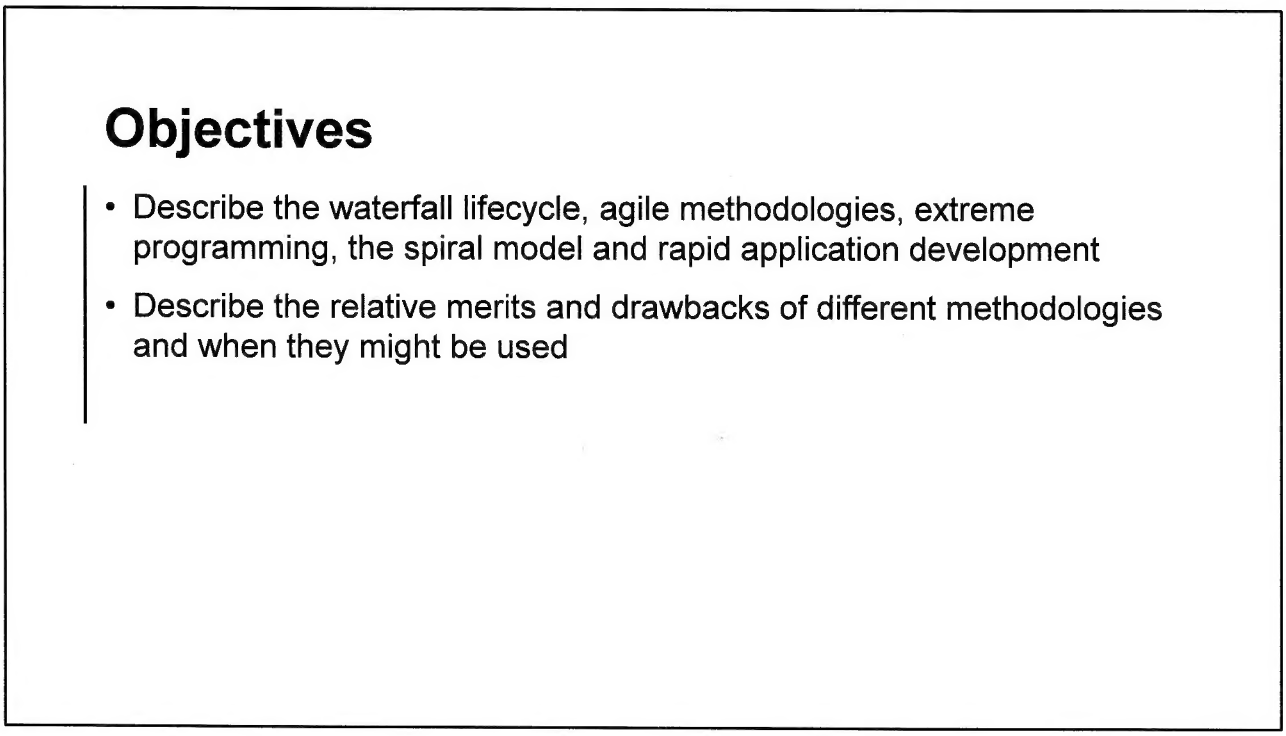
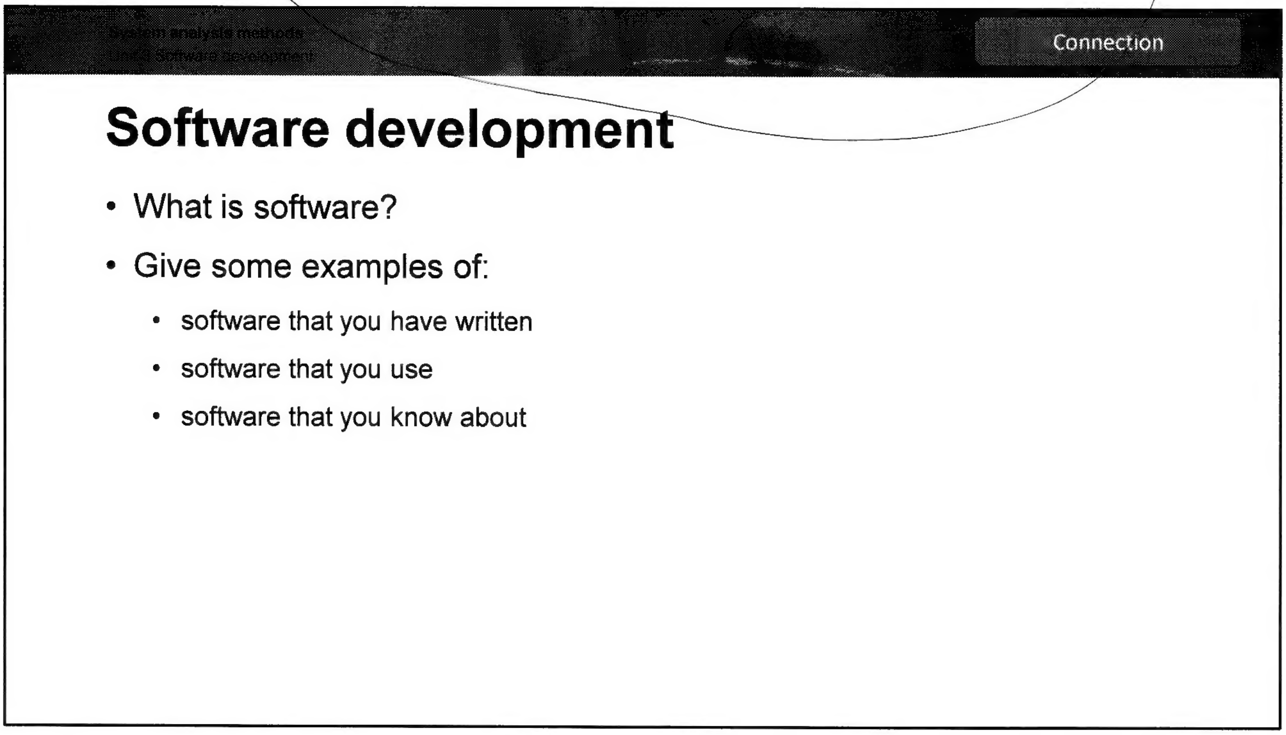


System Analysis Methods



Objectives

- Describe the waterfall lifecycle, agile methodologies, extreme programming, the spiral model and rapid application development
- Describe the relative merits and drawbacks of different methodologies and when they might be used

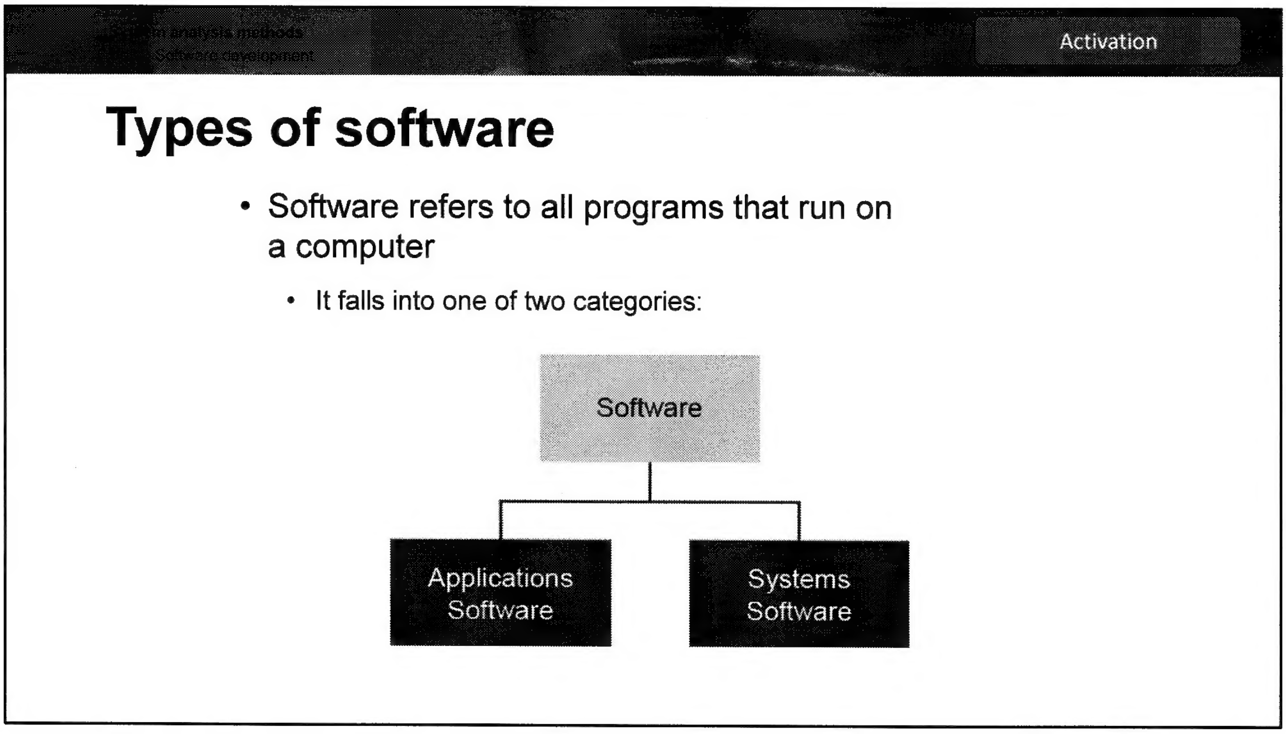


System analysis methods
Unit 8 Software development

Connection

Software development

- What is software?
- Give some examples of:
  - software that you have written
  - software that you use
  - software that you know about



System analysis methods
Software development

Activation

Types of software

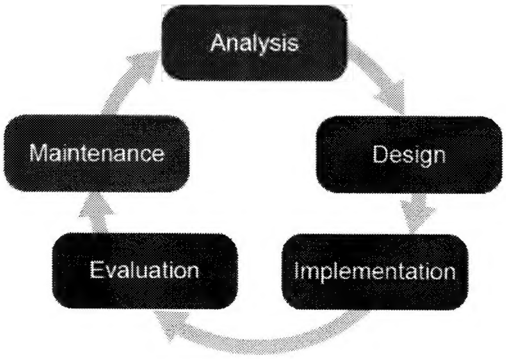
- Software refers to all programs that run on a computer
  - It falls into one of two categories:

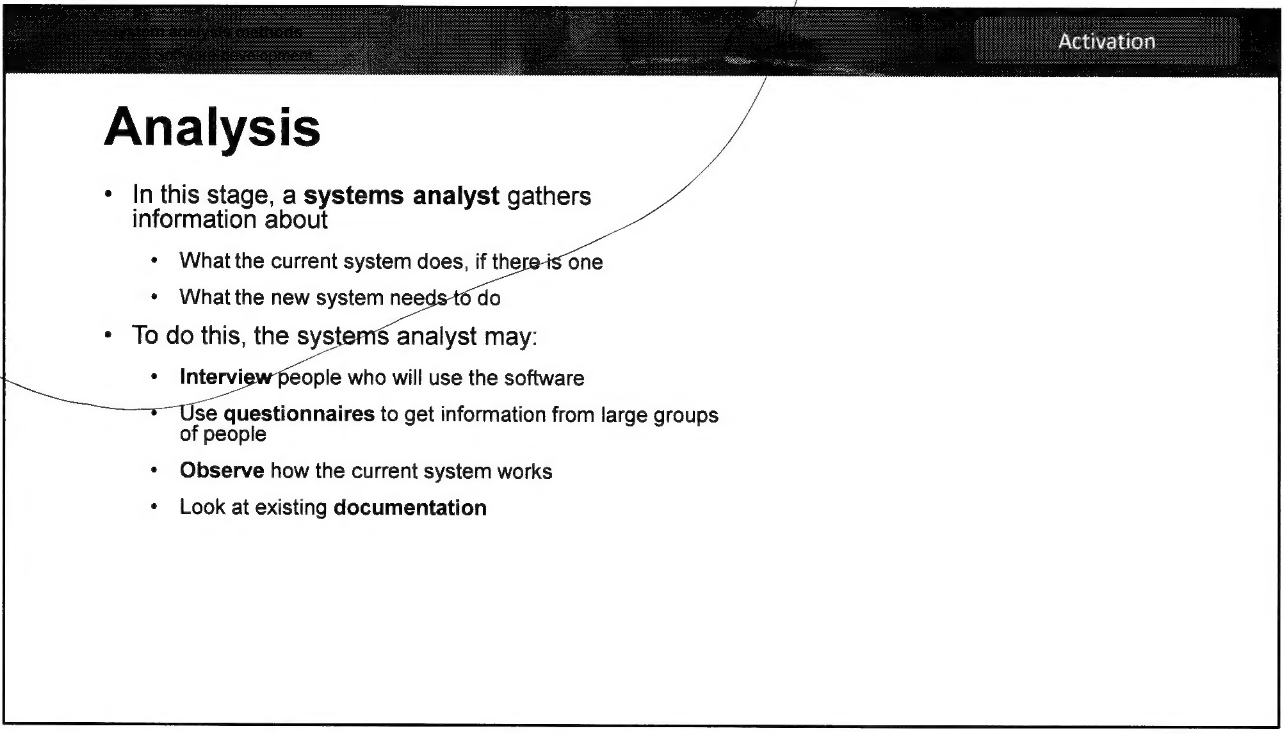
Software development

- Software development, from the initial idea to the final product, follows distinct stages
  - Analysis
  - Design
  - Implementation (programming, testing and installation)
  - Evaluation
  - Maintenance

The systems development life cycle

- This is often shown as a circle:



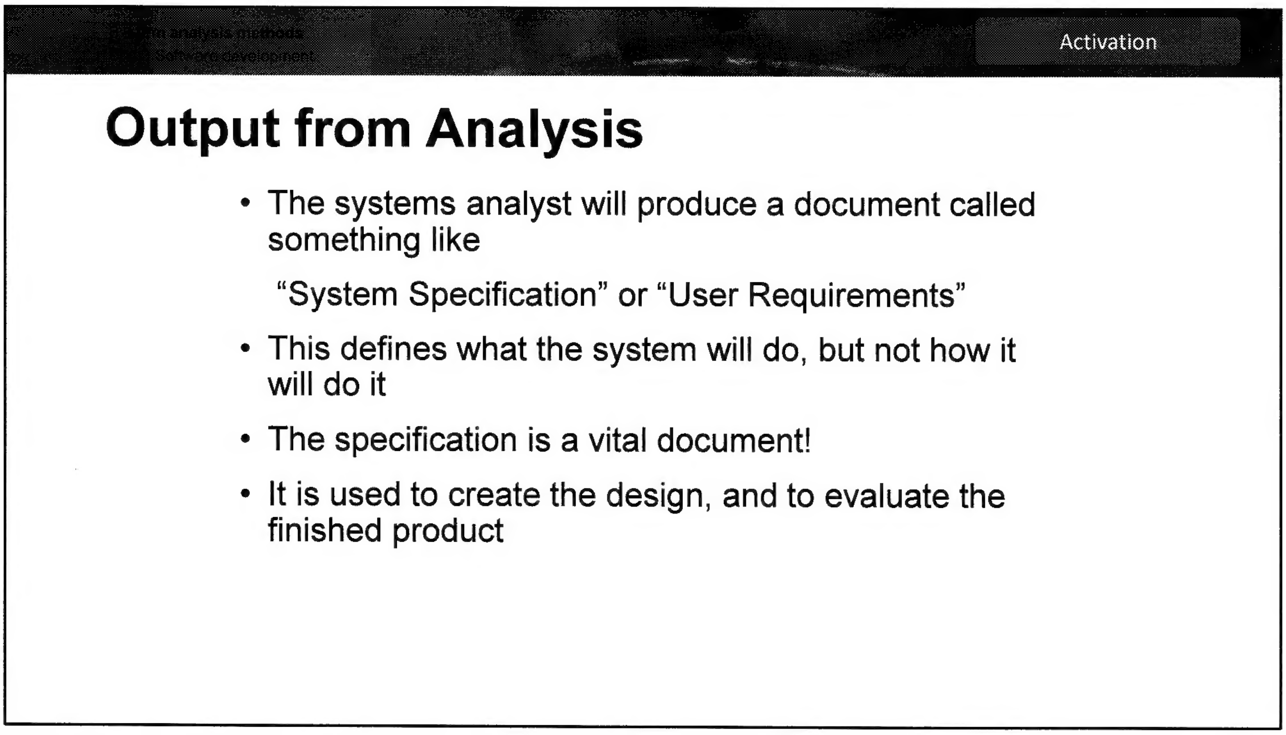


System analysis methods
Unit 3 Software development

Activation

Analysis

- In this stage, a **systems analyst** gathers information about
  - What the current system does, if there is one
  - What the new system needs to do
- To do this, the systems analyst may:
  - **Interview** people who will use the software
  - Use **questionnaires** to get information from large groups of people
  - **Observe** how the current system works
  - Look at existing **documentation**



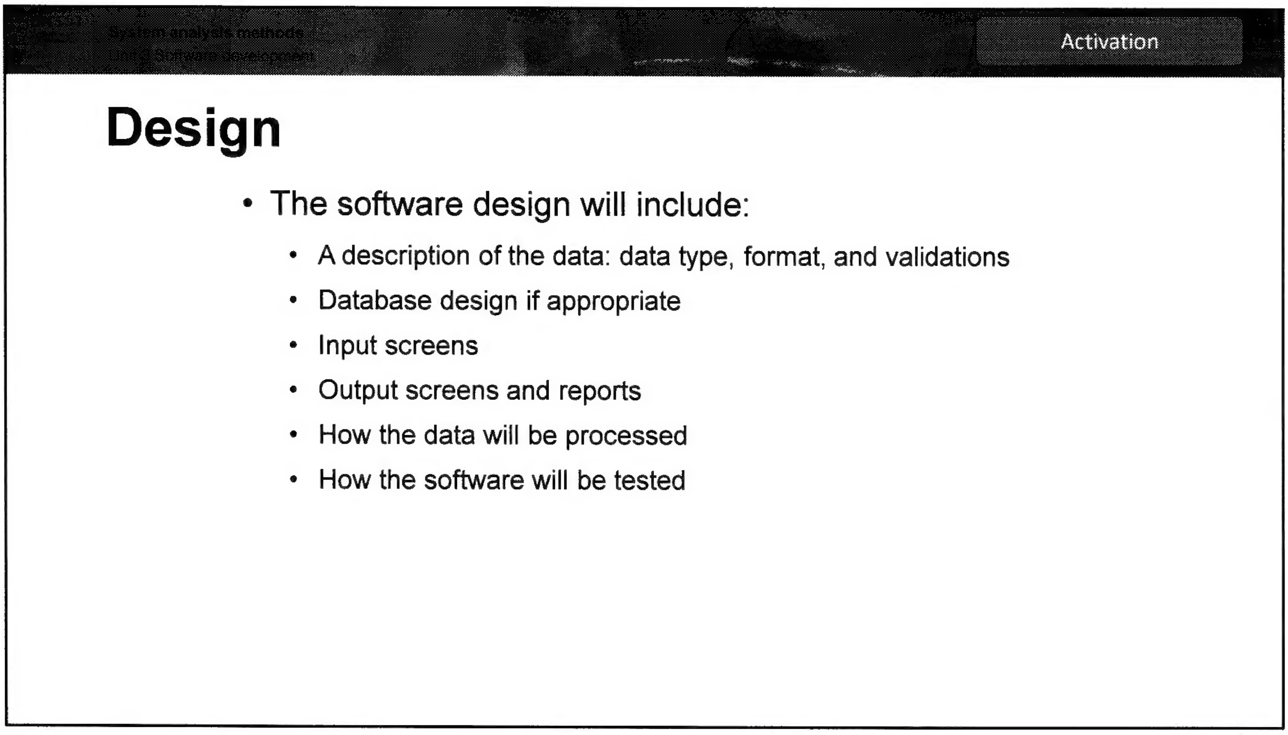
System analysis methods
Unit 3 Software development

Activation

Output from Analysis

- The systems analyst will produce a document called something like

  "System Specification" or "User Requirements"
- This defines what the system will do, but not how it will do it
- The specification is a vital document!
- It is used to create the design, and to evaluate the finished product

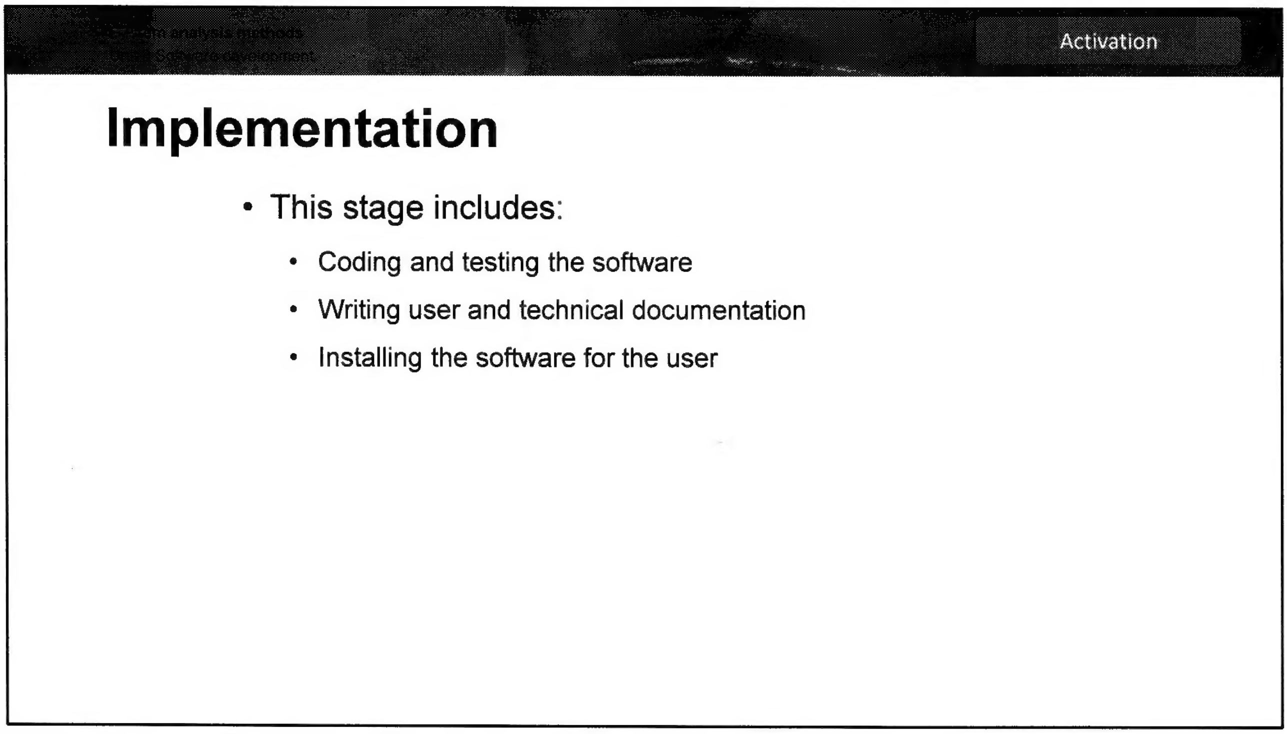


System analysis methods
Unit 3 Software development

Activation

Design

- The software design will include:
  - A description of the data: data type, format, and validations
  - Database design if appropriate
  - Input screens
  - Output screens and reports
  - How the data will be processed
  - How the software will be tested

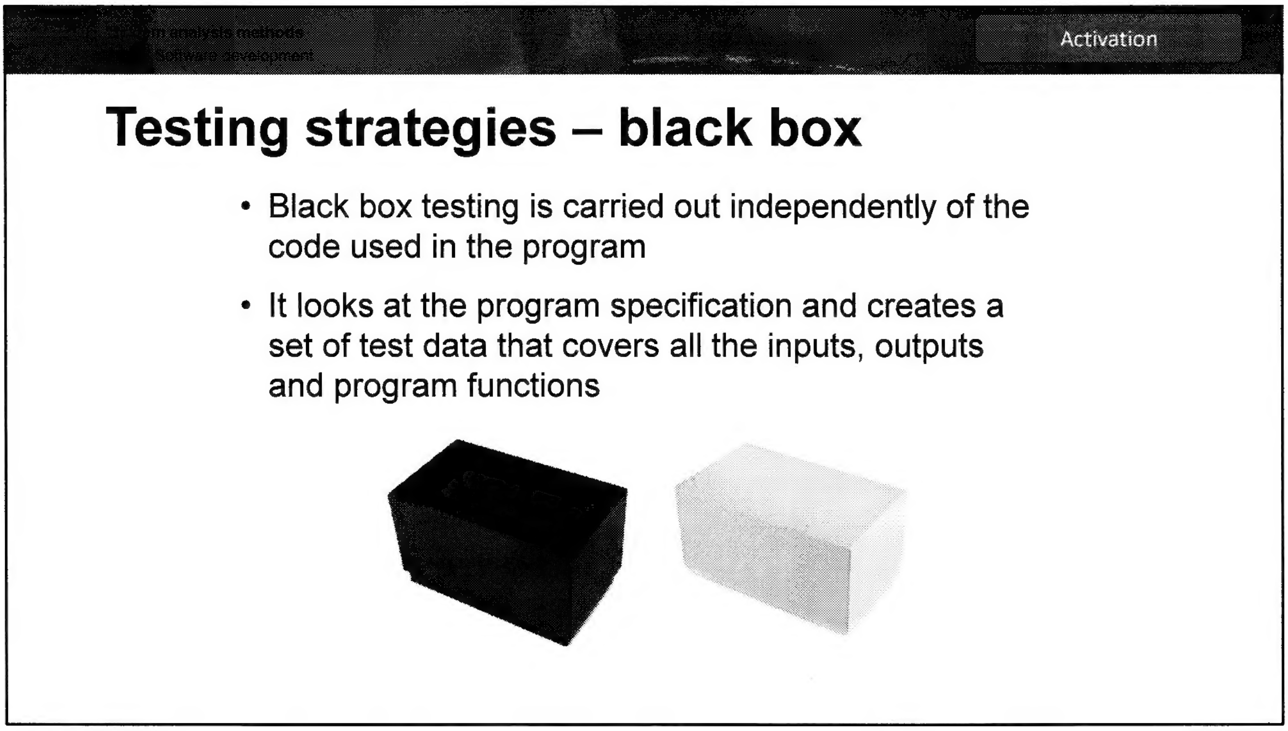


System analysis methods
Unit 3 Software development

Activation

Implementation

- This stage includes:
  - Coding and testing the software
  - Writing user and technical documentation
  - Installing the software for the user

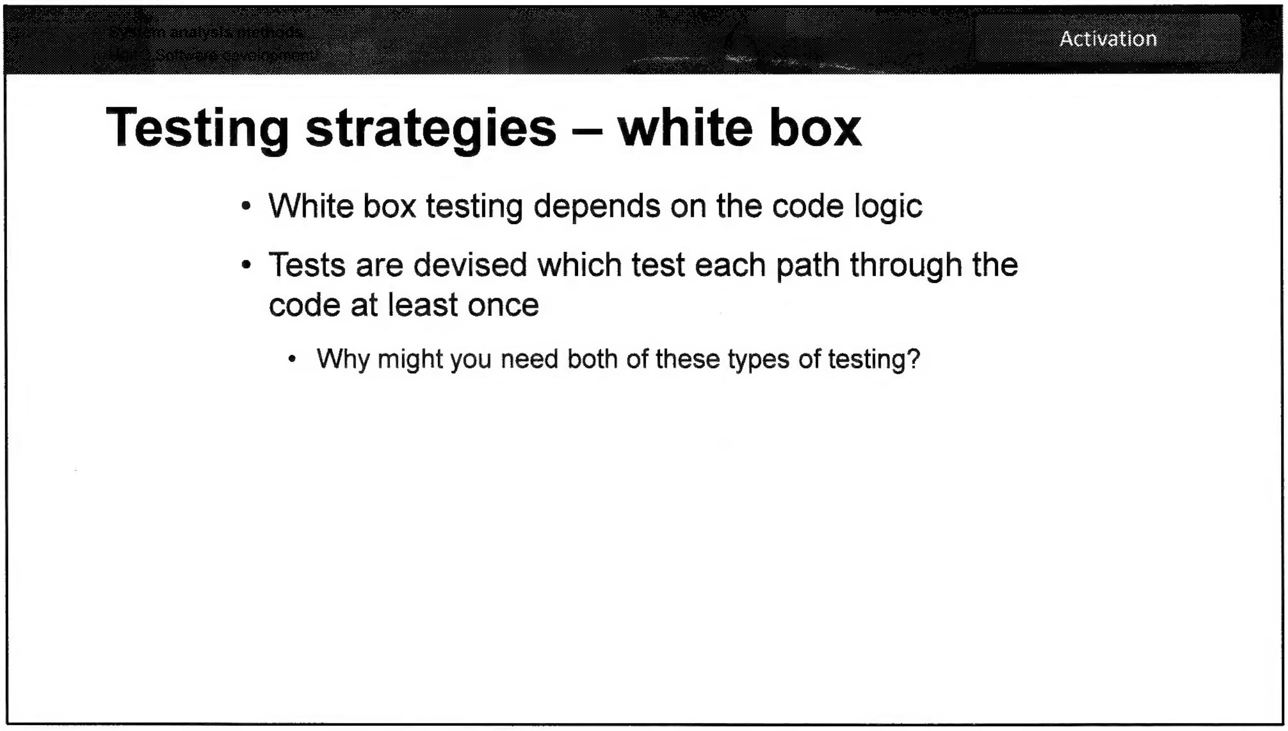


m analysis methods
Software development

Activation

Testing strategies – black box

- Black box testing is carried out independently of the code used in the program
- It looks at the program specification and creates a set of test data that covers all the inputs, outputs and program functions

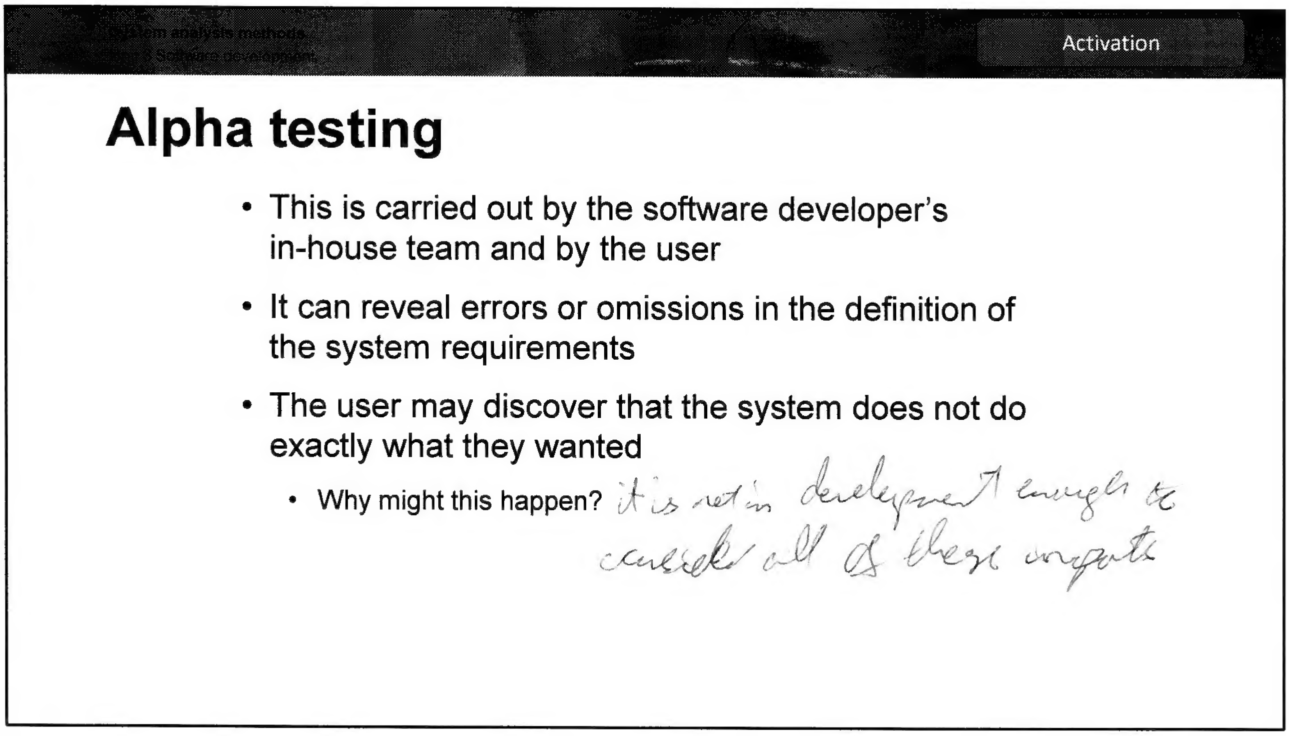


System analysis methods
Software development

Activation

Testing strategies – white box

- White box testing depends on the code logic
- Tests are devised which test each path through the code at least once
  - Why might you need both of these types of testing?

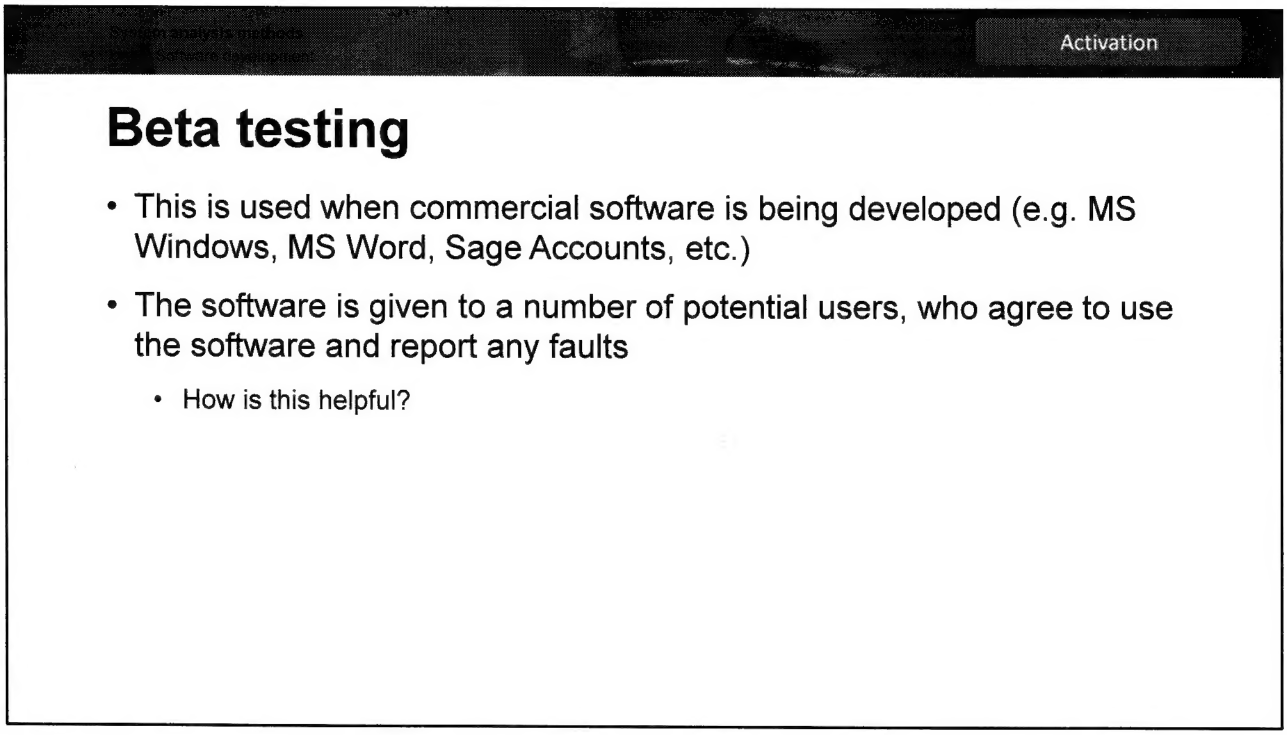


System analysis methods
Software development

Activation

Alpha testing

- This is carried out by the software developer's in-house team and by the user
- It can reveal errors or omissions in the definition of the system requirements
- The user may discover that the system does not do exactly what they wanted
  - Why might this happen? it is not in development enough to consider all of these aspects



System analysis methods
Software development

Activation

Beta testing

- This is used when commercial software is being developed (e.g. MS Windows, MS Word, Sage Accounts, etc.)
- The software is given to a number of potential users, who agree to use the software and report any faults
  - How is this helpful?

System analysis methods

[illegible] Software development

Activation

Beta testing

- Real users may try and do things the developer didn't anticipate!

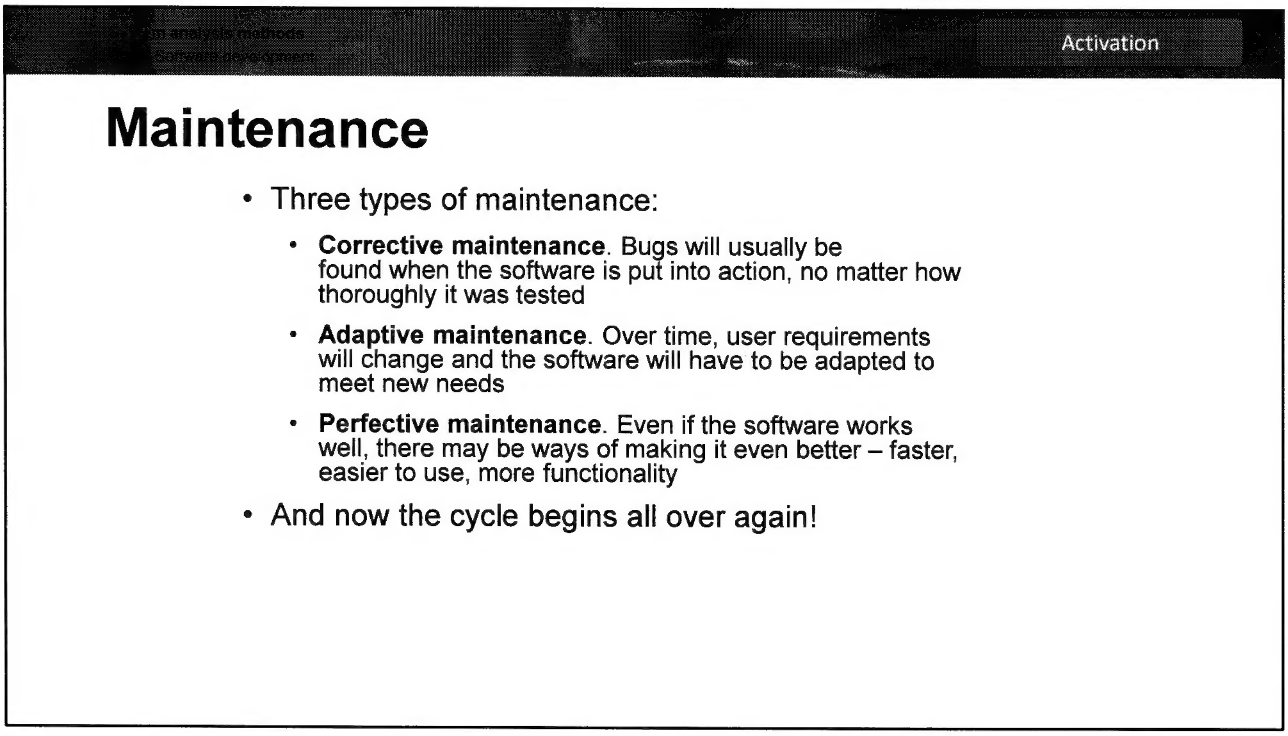
System analysis methods

[illegible] Software development

Activation

Evaluation

- Does it all work?
- The user now needs to test every aspect of the software to make sure it does what it is supposed to do
- It will be evaluated against the original specification document
- This stage is also called **Acceptance testing**

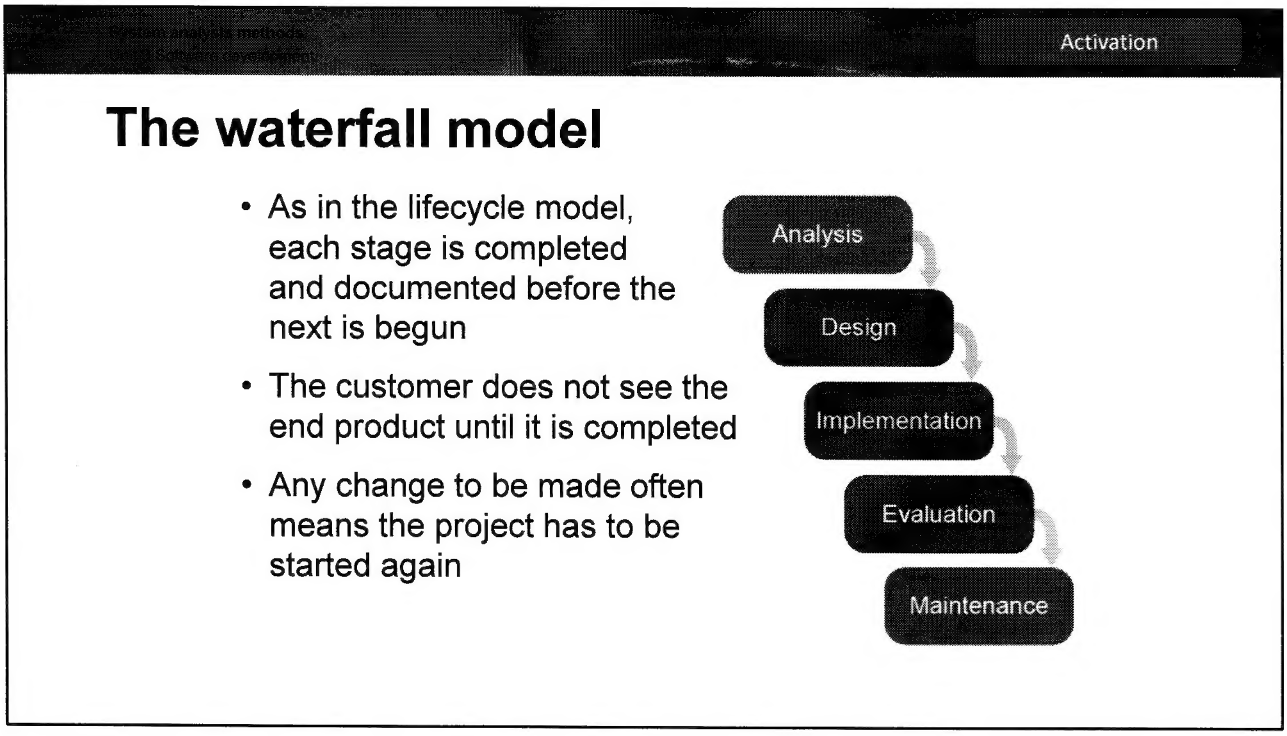


System analysis methods
Software development

Activation

Maintenance

- Three types of maintenance:
  - **Corrective maintenance**. Bugs will usually be found when the software is put into action, no matter how thoroughly it was tested
  - **Adaptive maintenance**. Over time, user requirements will change and the software will have to be adapted to meet new needs
  - **Perfective maintenance**. Even if the software works well, there may be ways of making it even better – faster, easier to use, more functionality
- And now the cycle begins all over again!



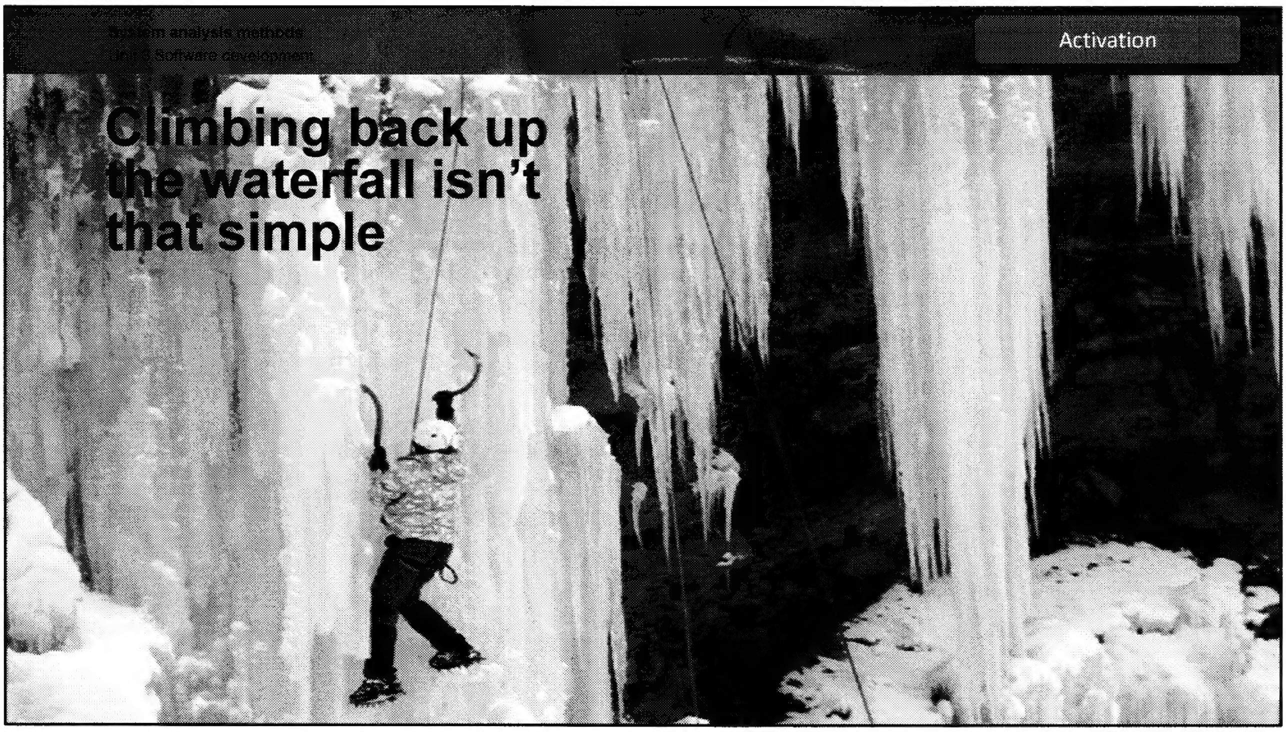
System analysis methods
Unit 3 Software development

Activation

The waterfall model

- As in the lifecycle model, each stage is completed and documented before the next is begun
- The customer does not see the end product until it is completed
- Any change to be made often means the project has to be started again

Analysis
Design
Implementation
Evaluation
Maintenance



System analysis methods
Unit 5 Software development

Activation

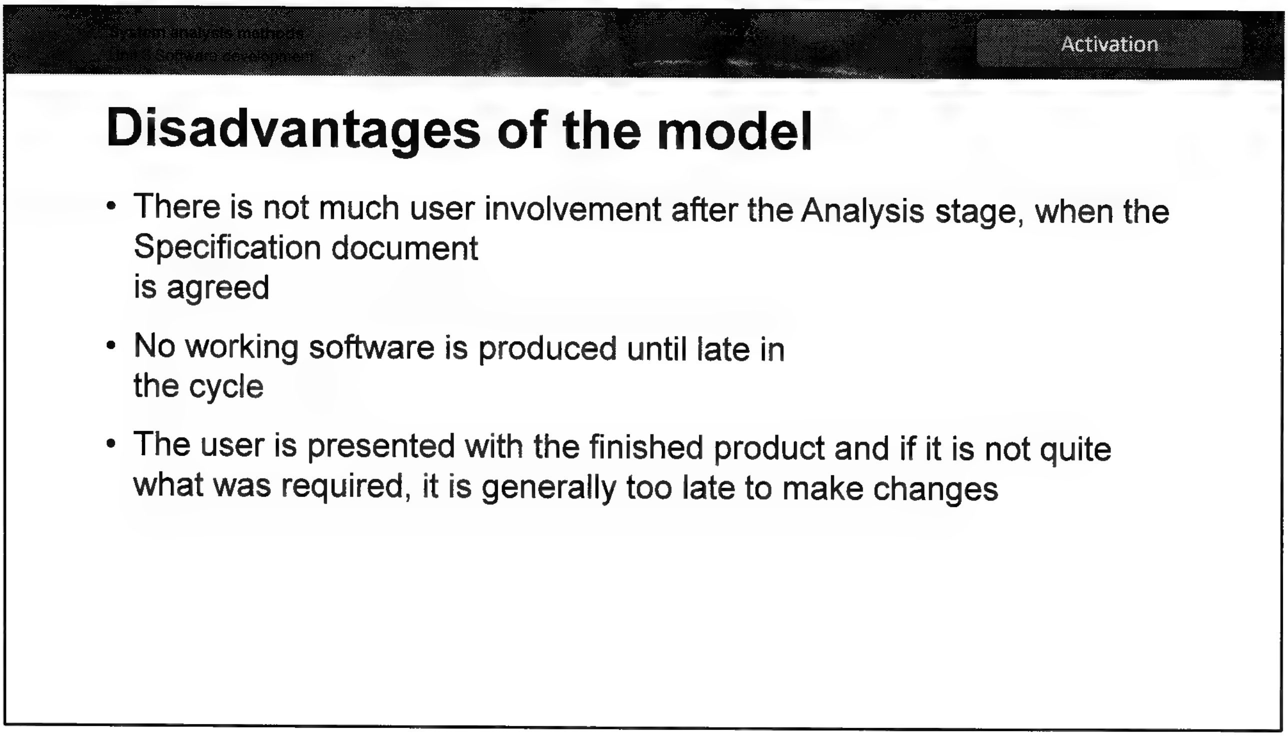
Climbing back up the waterfall isn't that simple

System analysis methods
Unit 5 Software development

Activation

Advantages of this model

- The model is simple to understand and use
- Each stage is separate and self-contained with well defined outcomes and written documentation
- This makes the project relatively straightforward to manage
- The model works well for smaller projects where requirements are very well understood

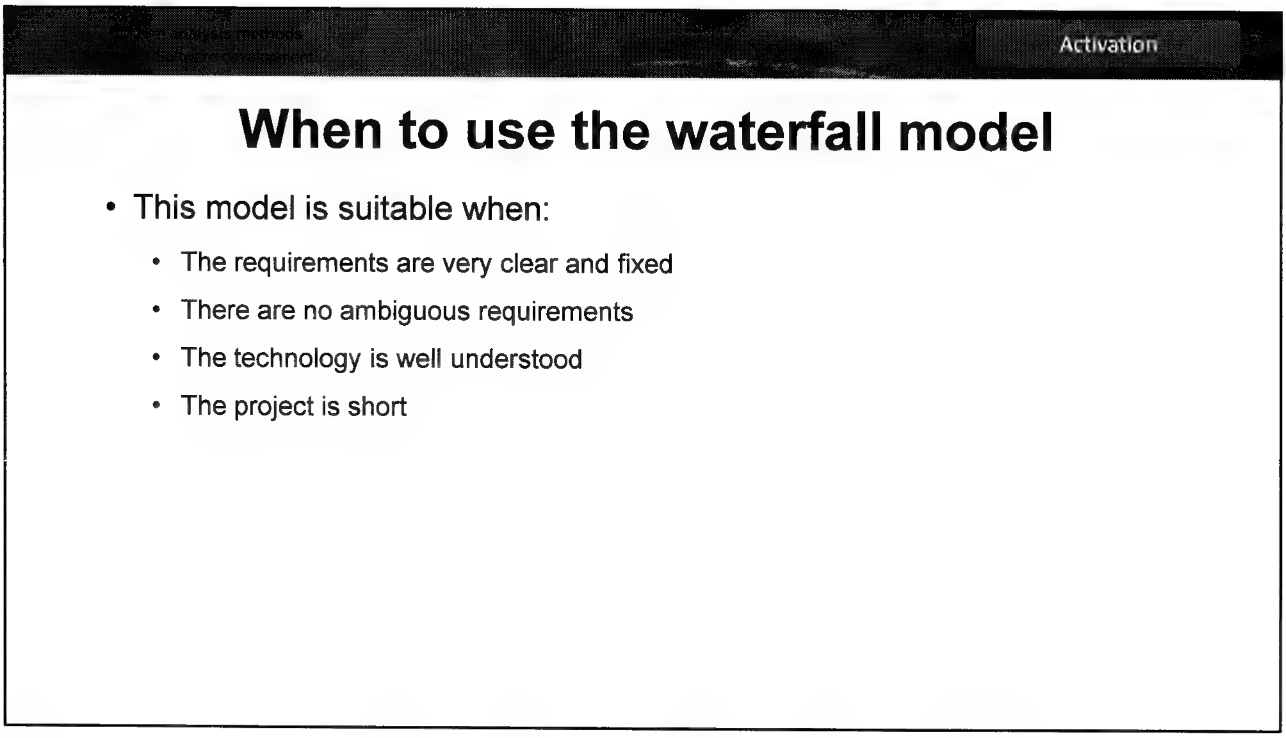


System analysis methods
Unit 4 Software development

Activation

Disadvantages of the model

- There is not much user involvement after the Analysis stage, when the Specification document is agreed
- No working software is produced until late in the cycle
- The user is presented with the finished product and if it is not quite what was required, it is generally too late to make changes



System analysis methods
Unit 4 Software development

Activation

When to use the waterfall model

- This model is suitable when:
  - The requirements are very clear and fixed
  - There are no ambiguous requirements
  - The technology is well understood
  - The project is short

System analysis methods
Unit 3 Software development

Demonstration

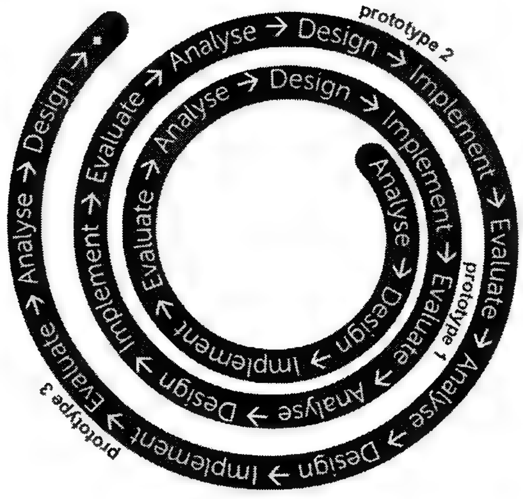
Worksheet 1

- Now try **Task 1**, **Questions 1 and 2** on the worksheet

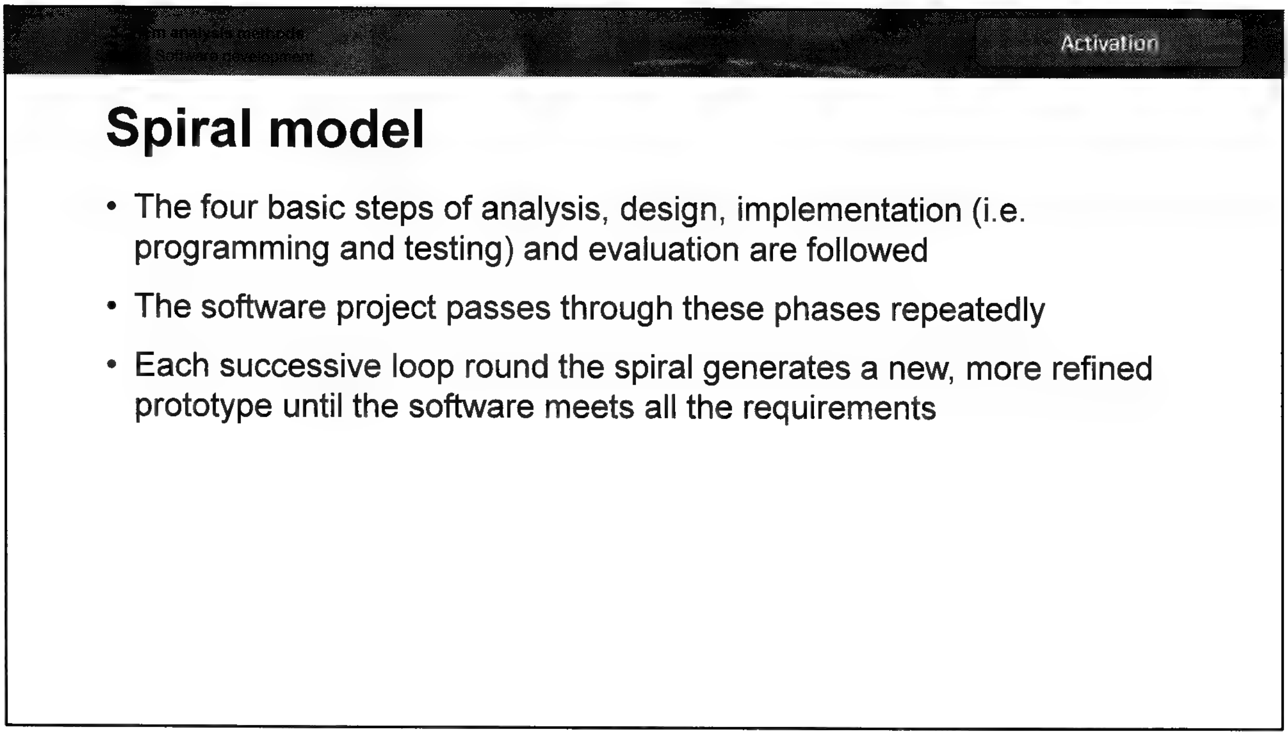
System analysis methods
Unit 3 Software development

Activation

The spiral model



Analyse → Design → Implement → Evaluate → Analyse → Design → Implement → Evaluate → Analyse → Design → Implement → Evaluate → Analyse → Design → Implement → Evaluate → Analyse → Design →

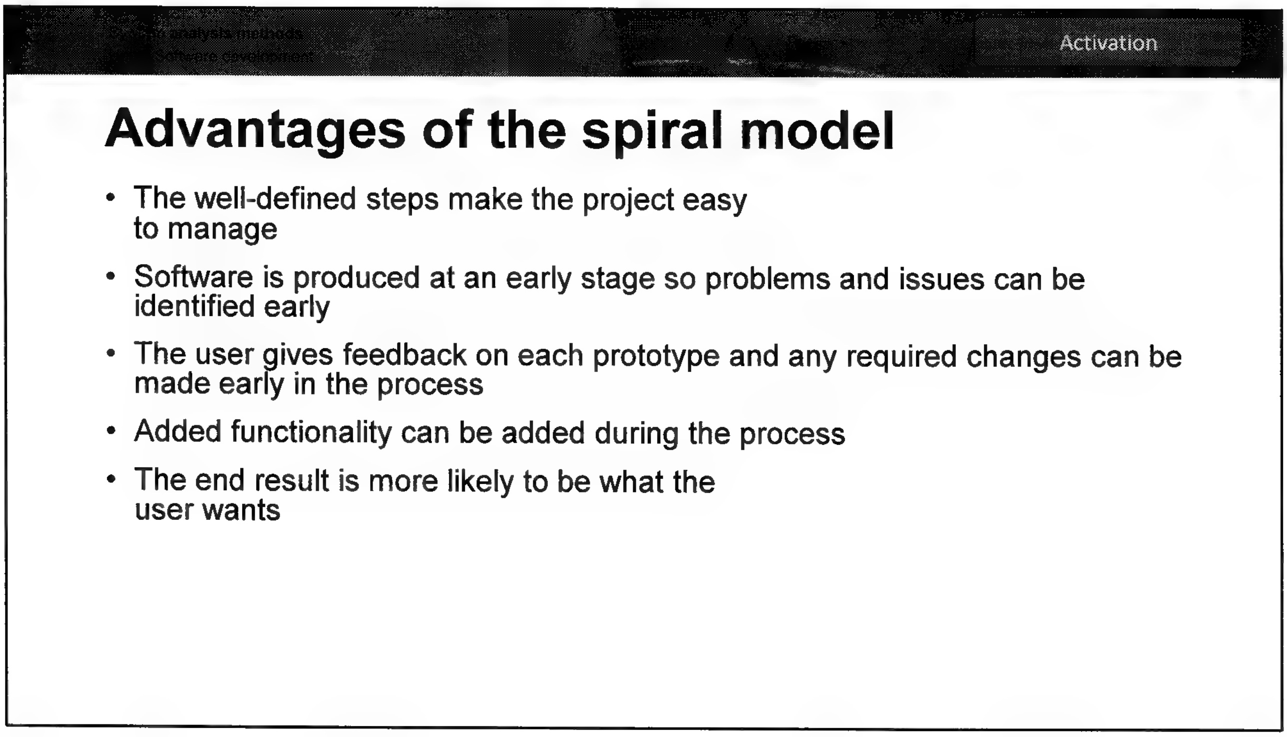


m analysis methods
Software development

Activation

Spiral model

- The four basic steps of analysis, design, implementation (i.e. programming and testing) and evaluation are followed
- The software project passes through these phases repeatedly
- Each successive loop round the spiral generates a new, more refined prototype until the software meets all the requirements

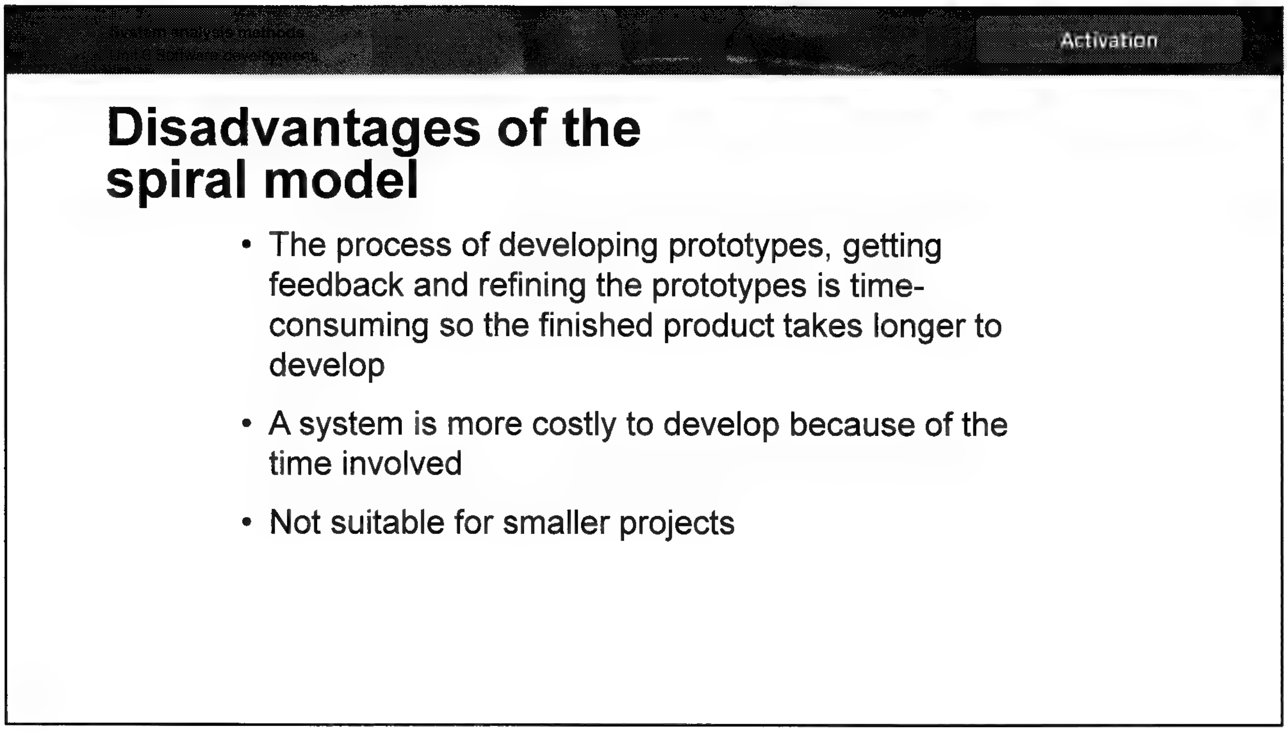


m analysis methods
Software development

Activation

Advantages of the spiral model

- The well-defined steps make the project easy to manage
- Software is produced at an early stage so problems and issues can be identified early
- The user gives feedback on each prototype and any required changes can be made early in the process
- Added functionality can be added during the process
- The end result is more likely to be what the user wants

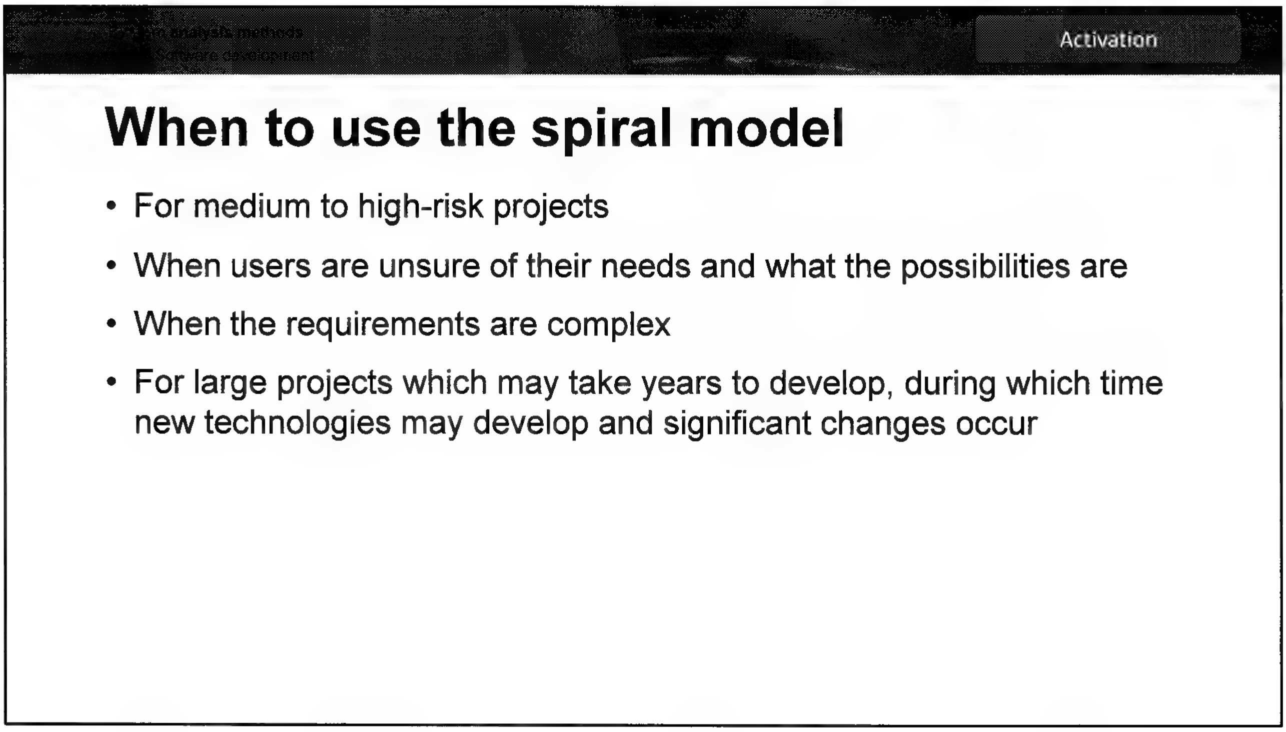


System analysis methods
Unit 6 Software development

Activation

Disadvantages of the spiral model

- The process of developing prototypes, getting feedback and refining the prototypes is time-consuming so the finished product takes longer to develop
- A system is more costly to develop because of the time involved
- Not suitable for smaller projects



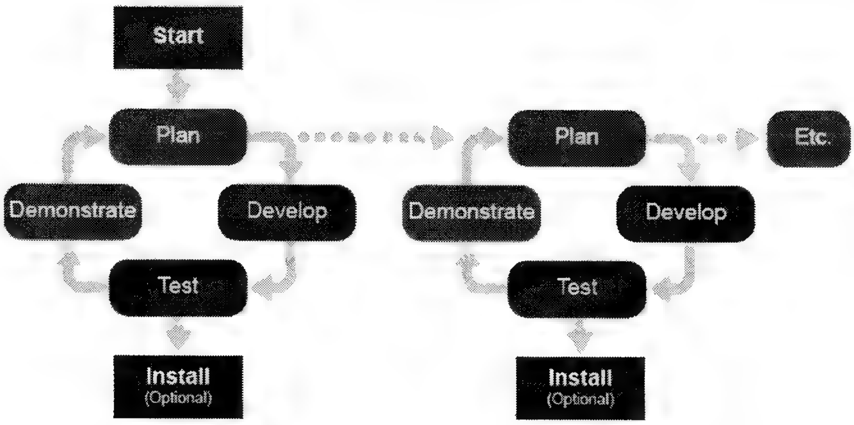
System analysis methods
Unit 6 Software development

Activation

When to use the spiral model

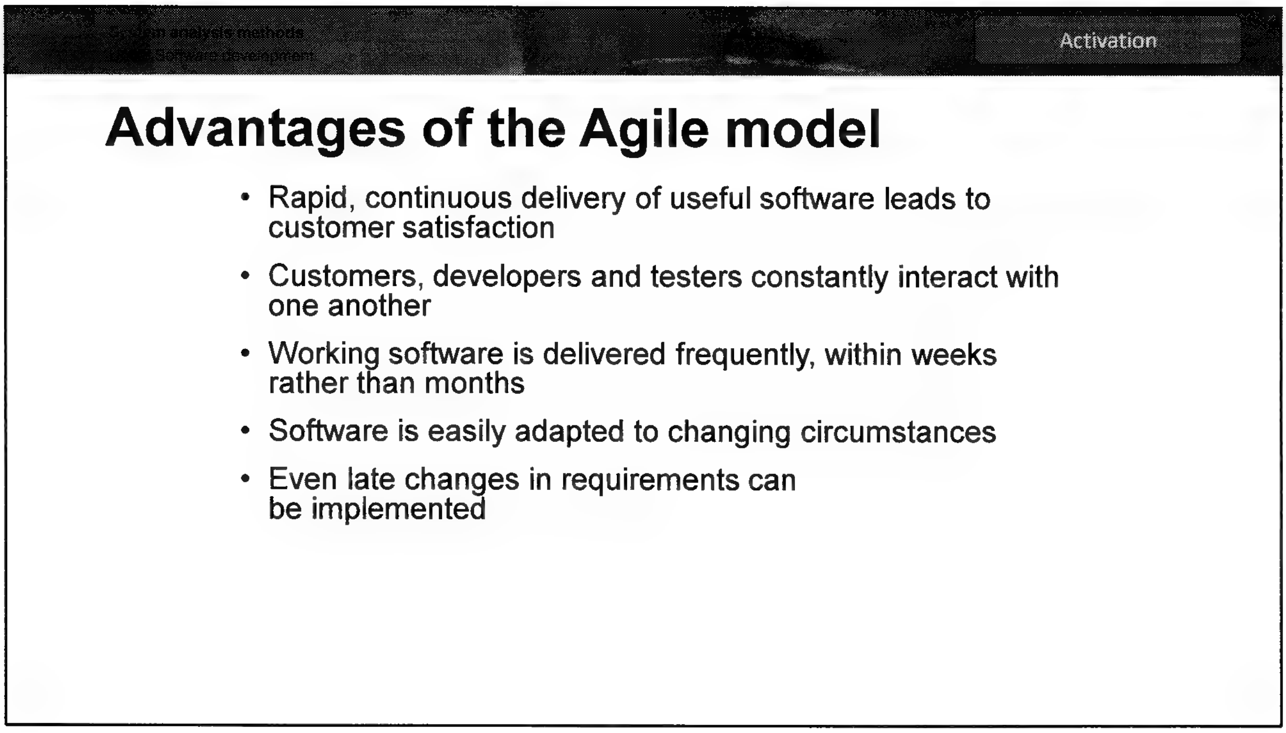
- For medium to high-risk projects
- When users are unsure of their needs and what the possibilities are
- When the requirements are complex
- For large projects which may take years to develop, during which time new technologies may develop and significant changes occur

The Agile model



The Agile model

- Software is developed in rapid incremental cycles
- Each version builds on previous functionality
- Each version is thoroughly tested before release
- Good for small, time-critical projects
- Limited planning is needed to get started

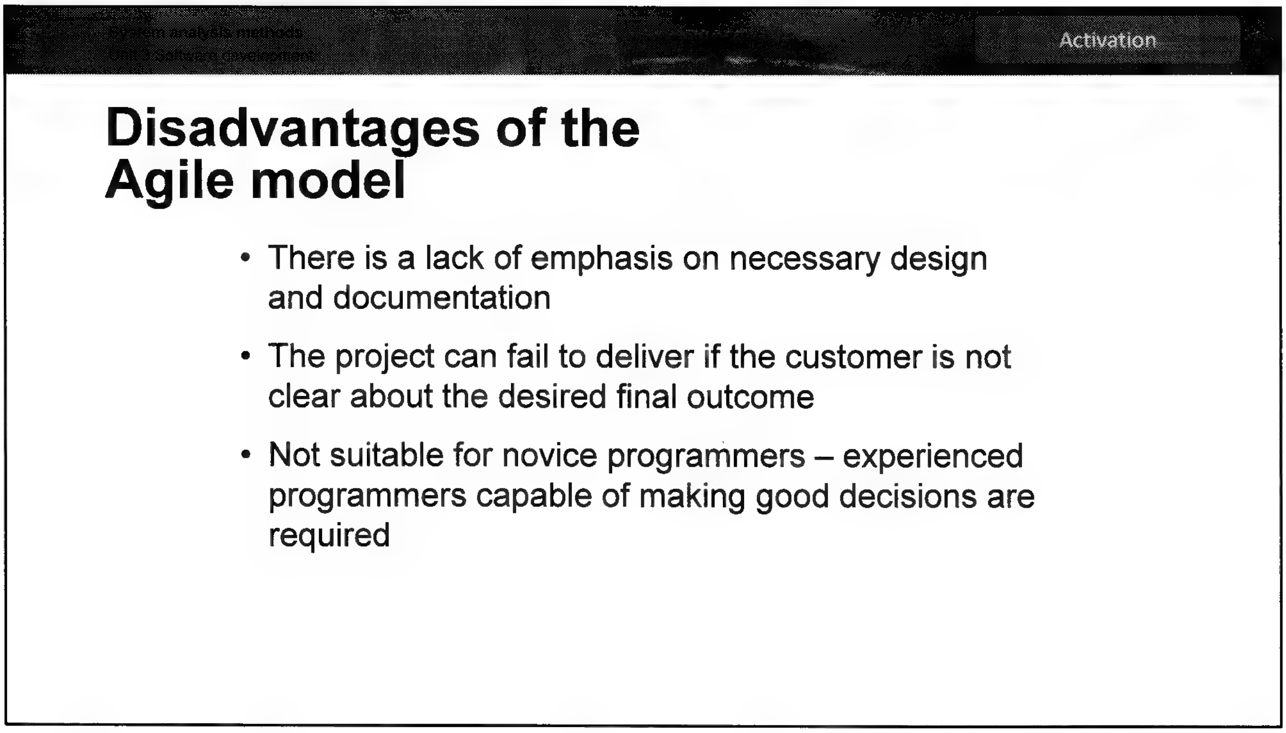


System analysis methods
Unit 3 Software development

Activation

Advantages of the Agile model

- Rapid, continuous delivery of useful software leads to customer satisfaction
- Customers, developers and testers constantly interact with one another
- Working software is delivered frequently, within weeks rather than months
- Software is easily adapted to changing circumstances
- Even late changes in requirements can be implemented

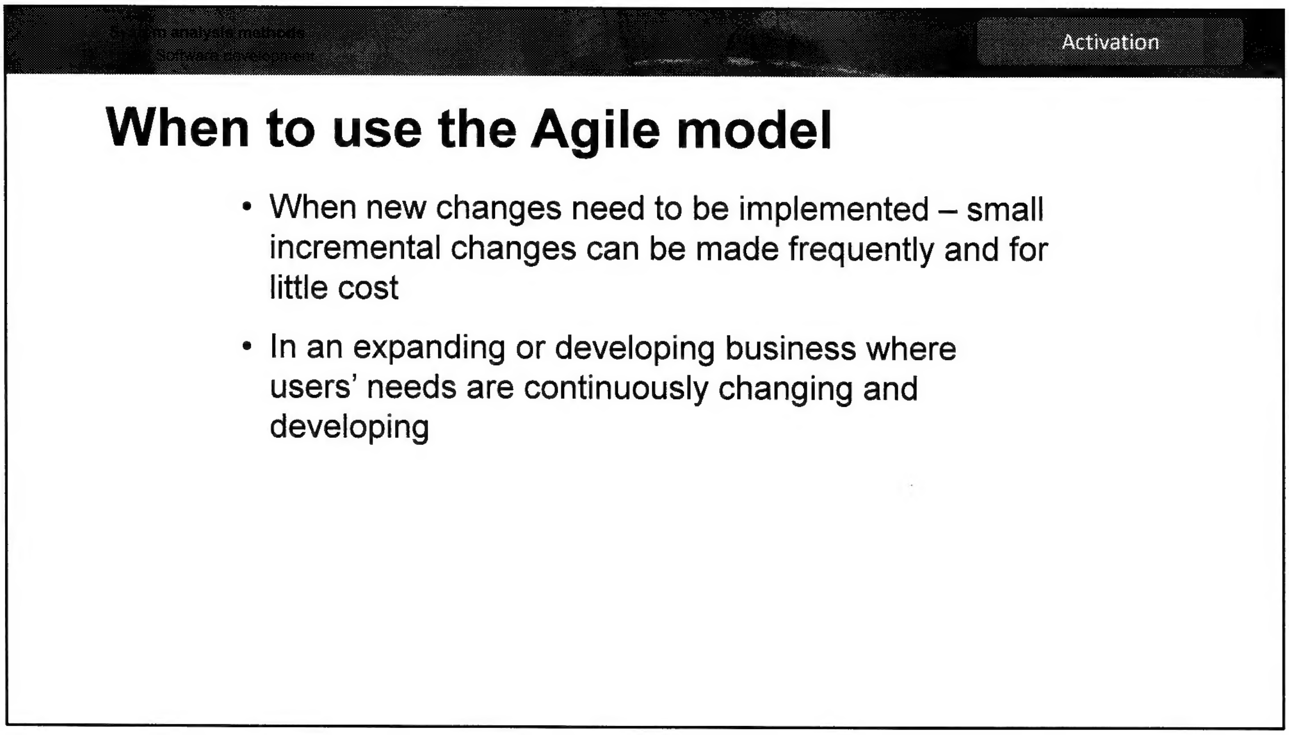


System analysis methods
Unit 3 Software development

Activation

Disadvantages of the Agile model

- There is a lack of emphasis on necessary design and documentation
- The project can fail to deliver if the customer is not clear about the desired final outcome
- Not suitable for novice programmers – experienced programmers capable of making good decisions are required

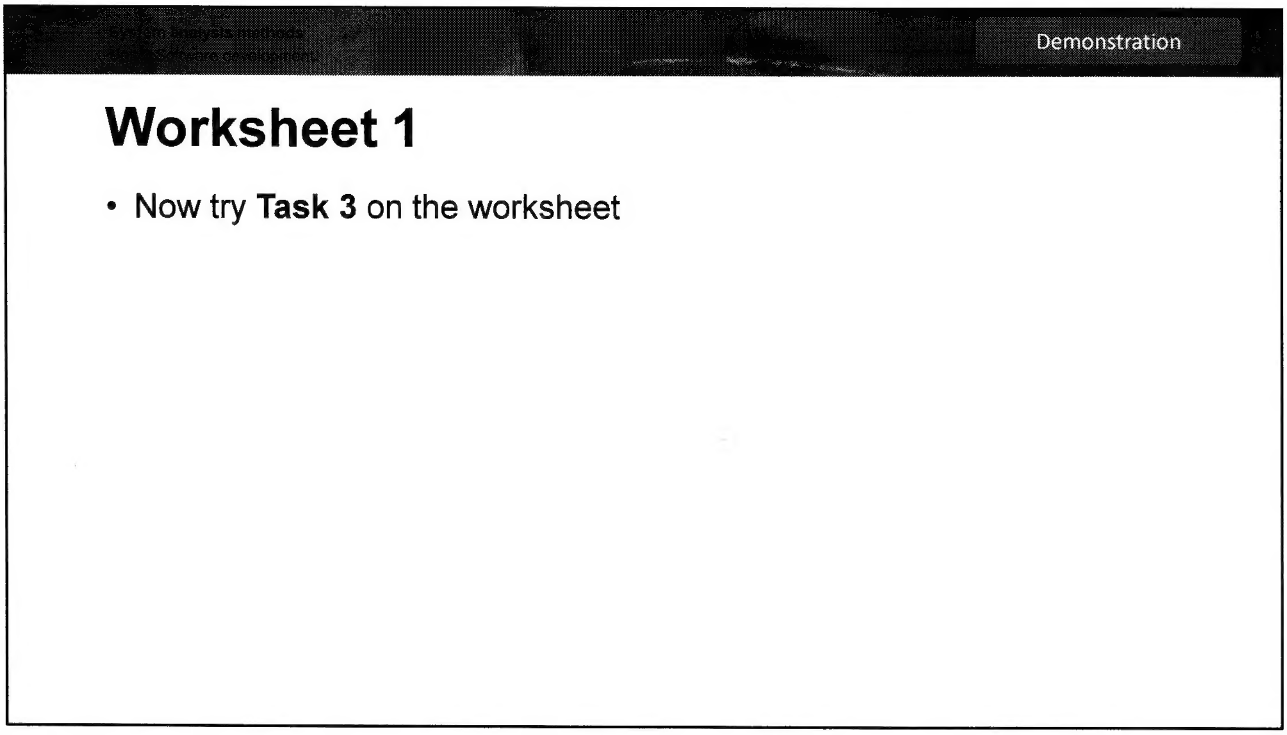


System analysis methods
Software development

Activation

When to use the Agile model

- When new changes need to be implemented – small incremental changes can be made frequently and for little cost
- In an expanding or developing business where users' needs are continuously changing and developing

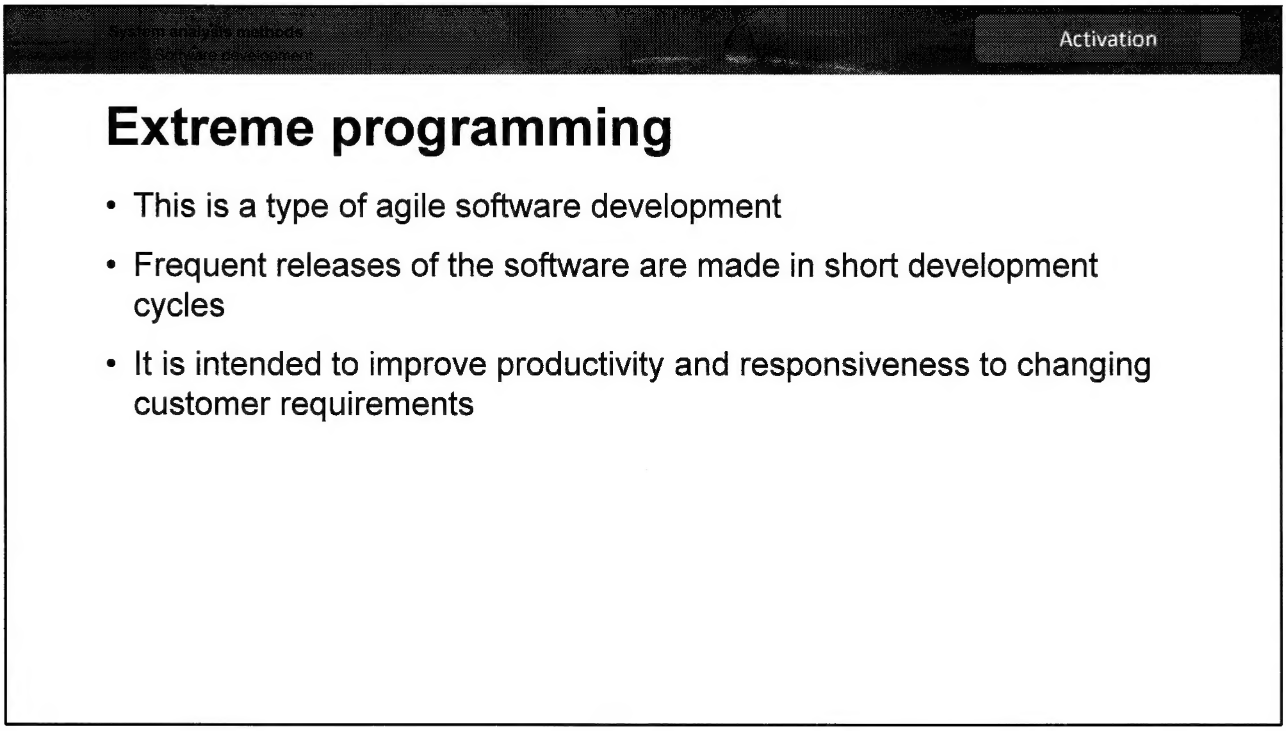


System analysis methods
Software development

Demonstration

Worksheet 1

- Now try **Task 3** on the worksheet

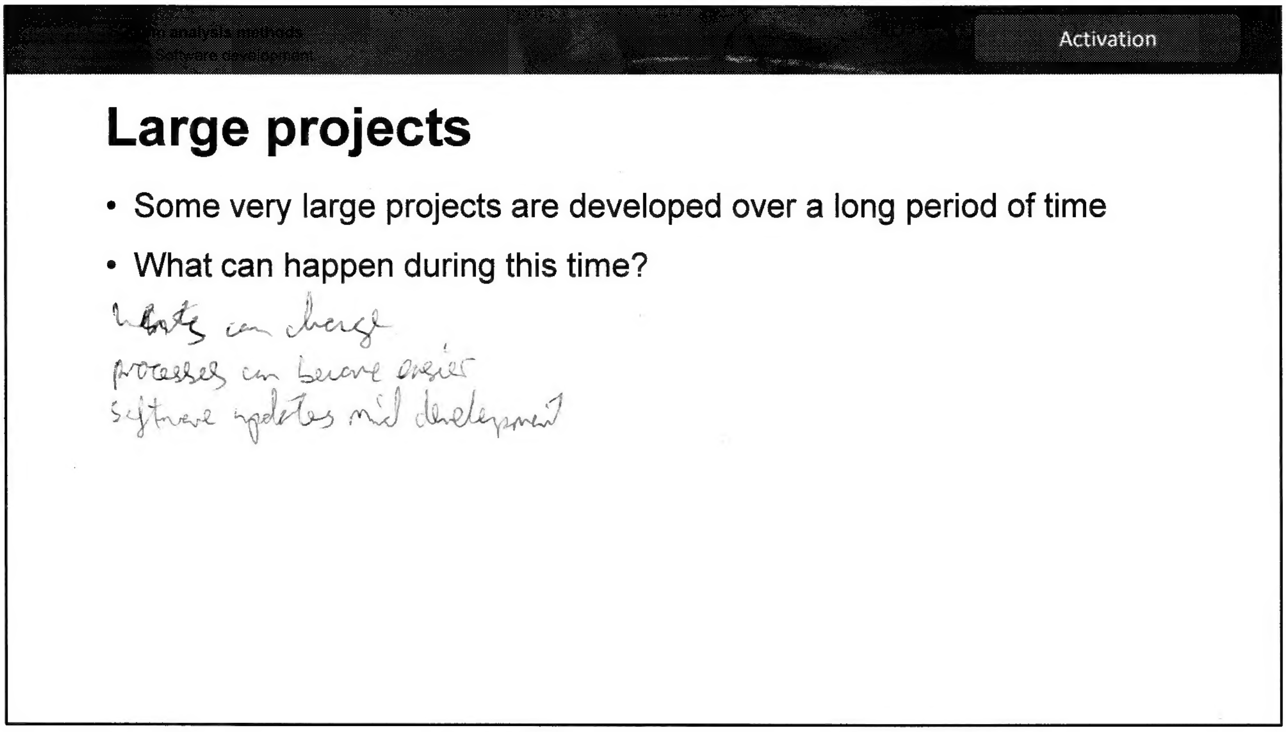


System analysis methods
Unit [illegible] Software development

Activation

Extreme programming

- This is a type of agile software development
- Frequent releases of the software are made in short development cycles
- It is intended to improve productivity and responsiveness to changing customer requirements



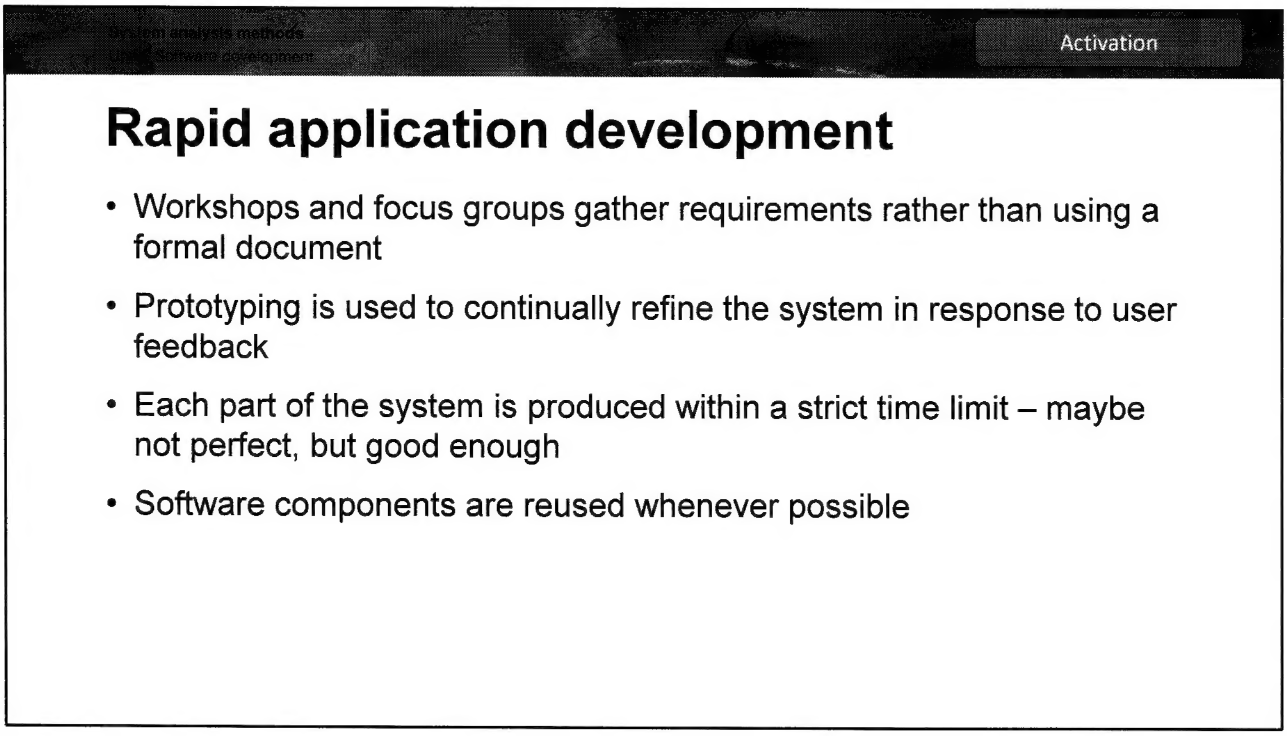
System analysis methods
Unit [illegible] Software development

Activation

Large projects

- Some very large projects are developed over a long period of time
- What can happen during this time?

Wants can change
processes can become easier
software updates mid development

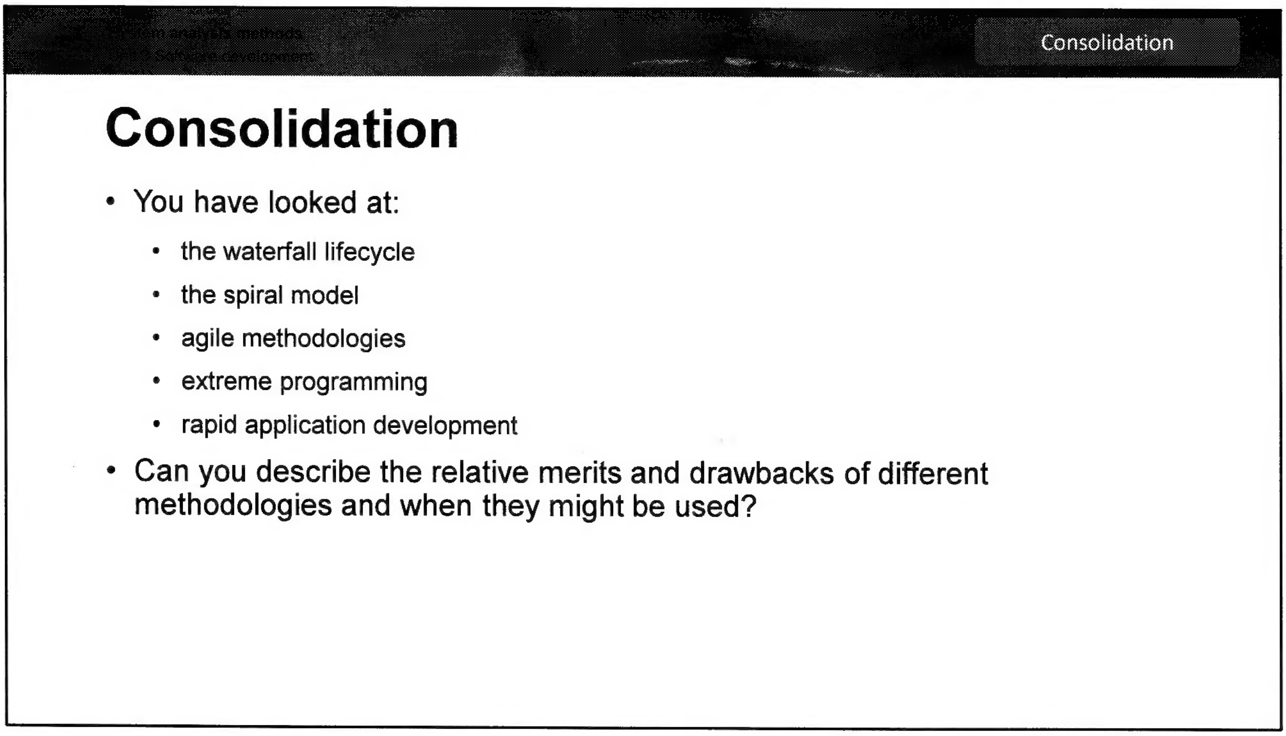


System analysis methods
Unit [illegible] Software development

Activation

Rapid application development

- Workshops and focus groups gather requirements rather than using a formal document
- Prototyping is used to continually refine the system in response to user feedback
- Each part of the system is produced within a strict time limit – maybe not perfect, but good enough
- Software components are reused whenever possible



System analysis methods
Unit [illegible] Software development

Consolidation

Consolidation

- You have looked at:
  - the waterfall lifecycle
  - the spiral model
  - agile methodologies
  - extreme programming
  - rapid application development
- Can you describe the relative merits and drawbacks of different methodologies and when they might be used?